REMARKS

Claims 1, 2, 4-9, 11-17, and 19-26 are currently pending. In the Office Action mailed August 14, 2003 the Examiner objected to the drawings as well as the Specification. The Examiner then rejected claims 1-2, 4-9, 11-17 and 19-21 under 35 U.S.C. §102(e) as being anticipated by Blake et al. (USP 6,275,560). Claims 22-26 stand rejected under 35 U.S.C. §102(e) as being anticipated by Ozaki (USP 6,298,111). The Examiner also objected to the Amendment filed on May 20, 2003.

The Examiner objected to the drawings as failing to show every feature of the invention as specified in the claims. Specifically, the Examiner stated that "the non-zero voltage must be shown or the feature(s) canceled from the claim(s)." Applicant believes, however, that the Examiner has failed to appreciate that shown in Fig. 5. Fig. 5 is a representative cardiac data signal and a voltage modulation signal superimposed thereon. As is clearly illustrated, the voltage modulation signal 308 fluctuates between a minimum voltage level 310 and a maximum voltage level 314. The description of Fig. 5 set forth on page 9 of the Specification states that "[t]he highs and lows of the voltage signal 308 do not correspond to any particular voltage but illustrate a maximum and minimum voltage as a function of total voltage." The Specification also states that the minimum voltage may be a zero voltage; however, it is not required to be set to a level of zero volts. *See* p. 10, ll. 11-19. As such, Applicant respectfully believes that every feature of the claimed invention is shown in the drawings. Withdrawal of the Examiner's objection to the drawings is therefore requested.

For reasons similar to the objection to the drawings, the Examiner also objected to the Specification on the conclusion that "non-zero voltage is not described in the specification." As pointed out above, the Specification clearly sets forth that the minimum voltage may or may not be zero volts. *See* Application, p. 8, ll. 26-27, p. 9, ll. 28-32, and p. 10, ll. 11-19. Accordingly, Applicant believes that the Specification provides a proper antecedent basis for the claimed subject matter as required by 37 CFR §1.75(d)(1) and MPEP §608.01(o). Withdrawal of the objection to the Specification is requested.

Claims 1-2, 4-9, 11-17, and 19-21 stand rejected as being anticipated by Blake et al. Blake et al. teaches a cardiac gated computed tomography system that utilizes short bursts of x-rays to acquire data from a selected portion of a heart cycle of a patient. Col. 3, lns. 2-6. Specifically, Blake t al. teaches a synchronization unit that "transitions the state of the x-ray-on

signal after delaying a selected period of time from the heart cycle representing the selected portion of the heart." Col. 3, lns. 47-50. In this regard, x-rays are only emitted during the selected period of the heart cycle. Col. 3, lns. 51-52. In an exemplary embodiment, Blake et al. describes transitioning the x-ray power source from zero volts to approximately 150 kilovolts in approximately 2 milliseconds, maintaining a 150 kilovolt output for 100 milliseconds, and returning to zero volts in approximately 200 milliseconds. Col. 4, lns. 11-17. Simply, the x-ray power source is driven to a non-zero voltage during a data acquisition portion of the cardiac cycle and driven to a zero voltage during another and non-data acquisition portion of the cardiac cycle. As a result, x-rays are emitted only during a portion of the cardiac cycle and data is only acquired for the selected period. Col. 4, lns. 20-21 and 36-37.

In the Amendment/Response filed May 20, 2003, the remarks of which are incorporated herein, Applicant explicitly and clearly defined the distinctions between that which is claimed in the present application and that which is taught by Blake et al. Applicant appreciates the Examiner indication that the remarks were considered and it is clear that the Examiner appreciates the distinctions between that which is claimed and that which is taught by the reference. However, the Examiner, based on the Response to Arguments portion of the August 14, 2003 Office Action, has failed to consider the exact language of the claims and is impermissibly reading the limitations of Blake et al. into the pending claims. Specifically, the Examiner has concluded that Blake et al.'s teaching of a first non-zero voltage and a second zero voltage describes that which is presently claimed because "nowhere in the claim teaches that the second voltage is energized at current state nor the x-ray source is at least minimally powered, rather the claim only teaches that the second voltage is achieved by in process of energizing (de-energizing) the first voltage." The Examiner then concluded that "[t]hus, Blake et al. clearly teaches that energizing (de-energizing) the high frequency energy source to a second voltage (zero)." The parenthetical terms clearly illustrates that the Examiner has failed to appreciate the meaning one skilled in the art would associate with the term "energizing".

Merriam Webster defines "energize" as "to supply voltage to." In contrast, Merriam Webster defines "de-energize" as "to disconnect from a source of electricity : shut off the power to". See attached. Clearly, the Examiner's inference that Blake et al. teaches energizing of a high frequency electromagnetic energy source to a second and zero voltage contradicts the plain meaning of the term "energize". Blake et al. teaches a voltage modulation signal to an x-

ray source that is defined by periods of non-zero voltage and periods of zero voltage. A zero voltage is achieved through de-energization, i.e. the shutting off of power to the x-ray source. Blake et al. does not teach energizing the x-ray source to a zero voltage as suggested by the Examiner. Energizing, by definition, requires the application of a voltage and, therefore, the reference's teaching of a zero voltage requires, at a minimum, ceasing of voltage supply to the x-ray source.

In contrast, the present invention is directed to a cardiac CT imaging process and system wherein a high frequency electromagnetic energy (i.e. x-ray) projection source is energized to a first voltage during a primary or first acquisition period of a cardiac cycle and energized to a second voltage during a secondary or second period of the cardiac cycle. As such, during one segment of the cardiac cycle, the x-ray source is energized to a greater voltage than during another segment of the cardiac cycle. However, throughout the entire cardiac cycle the x-ray source is at least minimally powered because, by definition, energizing requires the application of power to the projection source. That is, the projection source is energized to a first voltage level and then is energized to a second voltage level. Because the claims specifically calls for "energizing", it is incredulous for the Examiner to conclude that the second voltage level is a zero voltage level. Simply, "energizing" requires the application of power whereas Blake et al. clearly teaches a period of non-power application, i.e. zero volts.

In this regard, data acquisition occurs during both the primary acquisition period and the secondary acquisition period, i.e. throughout the entirety of the cardiac cycle. Since Blake et al. teaches driving the x-ray power source to a zero voltage during a portion of the cardiac cycle, portions or phases of the cardiac cycle are not imaged. That is, it is not possible to acquire data unless the x-rays source is minimally powered. Accordingly, utilizing the method taught by Blake et al., each phase of the cardiac cycle would have to be separately imaged in a separate scan thereby increasing dosage to the patient and/or increasing overall scan time similar to the scan-and-shoot method discussed in the Background of Invention section of the present application. That is, to acquire data for all phases of the cardiac cycle in accordance with the method taught by Blake et al. would require multiple scans because Blake et al. explicitly teaches data acquisition for only a portion of the cardiac cycle. Moreover, Blake et al.'s method results in each imaged phase of the cardiac cycle being subjected to the same amount of radiation dose if each phase of the cardiac cycle is imaged. Additionally, the process of Blake

et al. makes no provision for regions of the cardiac cycle that are to be imaged but not imaged at the maximum radiation dosage. Therefore, Blake et al.'s method neither reduces scan time nor reduces patient dosage.

Claim 1 calls for a method of voltage modulation for CT imaging that includes the steps energizing a HF electromagnetic energy source to a first voltage and acquiring a set of imaging data. The method further includes the step of after acquiring the set of imaging data, energizing the HF electromagnetic energy source to a second voltage until a period of delay after a next triggering pulse of a cardiac cycle. Blake et al. teaches driving the energy source to a zero voltage. Claim 1 calls for energizing to a first voltage and energizing to a second voltage. As pointed out above, "energizing" implies a non-zero voltage and, as such, Blake et al. fails to teach or suggest that which is called for in claim 1. Allowance thereof as well as claims 2 and 4-6 depending therefrom is requested.

Claim 7 calls for a radiation emitting imaging system that includes, in part, a control configured to energize a HF electromagnetic energy projection source to a first voltage during a primary data acquisition stage and to a second voltage during a secondary data acquisition stage. The control is further configured to reconstruct an image from data acquired during each data acquisition stage. As noted above, to acquire data, the projection source must be minimally energized. Further, claim 7 calls for image reconstruction of data from each data acquisition stage. Blake et al. teaches data acquisition for only one stage of a two stage cardiac cycle. See Col. 3, lns. 1-8. Therefore, Blake et al. fails to teach the reconstruction of an image from data acquired during each stage of a cardiac cycle. As such, the system called for in claim 7 as well as claims 8, 9 and 11-14 is patentably distinct from that taught and described by Blake et al.

Claim 15 calls for a computer readable storage medium having a computer program stored thereon and representing a set of instructions that when executed causes the computer to transmit a first voltage modulation signal to a voltage source configured to energize an x-ray projection source to a first voltage during each primary data acquisition stage of a cardiac cycle. The computer is further caused to transmit a second voltage modulation signal to the voltage source configured to energize the x-ray projection source to a second voltage during each secondary acquisition stage of the cardiac cycle. For reasons similar to those set forth above,

the presently claimed invention is patentably distinct from that taught by Blake et al. Allowance of claims 15-17 and 19-21 is therefore requested.

The Examiner also rejected claims 22-26 under 35 U.S.C. §102(e) as being anticipated by Ozaki. Ozaki teaches an x-ray computed tomography apparatus that includes a means for stopping irradiation of x-rays on a subject in a specific period of a cardiac cycle of the subject, and applying the x-rays onto the subject in a period other than in a specific period on the basis of a ECG. *See* Abstract of '111. Ozaki discloses a scanning procedure whereby patient exposure to radiation is regulated such that during one portion of a cardiac cycle, the patient is irradiated and, in another portion of the cardiac cycle, the patient's exposure to x-rays is reduced. In contrast to the claimed invention, Ozaki further teaches that projection data acquired during a non-x-ray stop period compensates for the lack of projection data acquired during an x-ray stop period. Col. 5, ll. 39-42. As stated by Ozaki, "the three arrows in Fig. 6 indicate that projection data in an X-ray stop period is generated by using projection data in an X-ray generation period." Col. 5, ll. 43-47. Simply put, Ozaki, unlike that which is claimed, does not acquire data during both periods. The method disclosed by Ozaki uses projection data from an x-ray generation stage to compensate for otherwise not acquired projection data during an x-ray stop stage.

The invention defined by claim 22, however, calls for CT data acquisition during a primary acquisition period and a secondary acquisition period. In this regard, CT data is acquired during each stage of the cardiac cycle. One skilled in the art would readily recognize that data "acquisition" is dissimilar from data "compensation". As such, that which is called for in claim 22 is patentably distinct from that taught and/or suggested by Ozaki.

Regarding the rejection of claim 24, Applicant has amended claim 24 to further define the control as being configured to acquire imaging data of the heart with the high frequency electromagnetic energy projection source at the first voltage and the second voltage. In this regard, data is acquired from the heart when the projection source is powered to both voltages. As discussed above, Ozaki neither teaches nor suggests data acquisition at two different voltage levels. Ozaki teaches the use of compensatory projection data from an x-ray period for the projection data of an x-ray stop period. As such, Applicant believes that which is called for in claims 24-26 is patentably distinct from that taught or suggested by Ozaki.

In light of the foregoing Amendments and Remarks Applicant respectfully believes the present application is in condition for allowance and therefore requests a Notice of Allowance for claims 1, 2, 4-9, 11-17, and 19-26.

With regard to the Examiner's objection to the Amendment of May 20, 2003, Applicant is unclear as to what the Examiner considers "new matter". Applicant did not amend the Specification or Drawings. As such, it would appear that the "new matter" objection is a result of the amendments made to the claims. However, a rejection under 35 U.S.C. §132 is not the proper basis of rejection or objection. If the Examiner believes that the amendments to the claims are unsupported, then a rejection under 35 U.S.C. §112 is more appropriate. Nevertheless, Applicant does not believe a rejection under either section is warranted in the present case. Specifically, Applicant refers the Examiner to the remarks set forth above with respect to the objection to the Drawings and Specification. As detailed above, the Specification clearly provides support for the amendments made in the claims. As such, Applicant believes the Examiner's objection to the May 20, 2003 Amendment cannot be sustained.

Applicant invites the Examiner to contact the undersigned with any questions to expedite the handling of this matter.

Respectfully submitted,

J. Mark Wilkinson
Registration No. 48,865
Direct Dial (262) 276-5016
jmw@zpspatents.com

Date: August 26, 2003
Atty. Docket No. GEMS8081.117

P.O. ADDRESS:

Ziolkowski Patent Solutions Group, LLC
14135 North Cedarburg Road
Mequon, Wisconsin 53097-1416
262.376.5170

Merriam-Webster

- Home
- Help
- Word of the Day
- Word Games
- W rd for the Wise
- Books and CDs
- Online Education
- Company Info
- Customer Service
- Network Options
- Language Zone
- The Lighter Side
- Site Map

Merriam-Webster Unabridged
Member Log-in

Merriam-Webster DICTIONARY

Atlas | Reverse Dictionary | Rhyming Dictionary
Dictionary | Thesaurus | Unabridged Dictionary

2 entries found for **energize**.
To select an entry, click on it.

energize
de-energize
Go

Main Entry: **en er gize**
Pronunciation: 'e-n&r-"jIz
Function: *verb*
Inflected Form(s): **-gized; -giz ing**
Date: 1752
intransitive senses : to put forth energy : ACT
transitive senses
1 : to make energetic , vigorous, or active
2 : to impart energy to
3 : to apply voltage to
- en er gi za tion /"e-n&r-"jI-'zA-sh&n/ *noun*
- en er giz er *noun*

Dictionary
Thesaurus
Britannica
energize Find
Ask Jeeves ASK JEEVES ABOUT: energize Ask

Pronunciation Symbols

Merriam-Webster

Merriam-Webster DICTIONARY

- Home
- Help
- Word of the Day
- Word Games
- Word for the Wise
- Books and CDs
- Online Education
- Company Info
- Customer Service
- Network Options
- Language Zone
- The Lighter Side
- Site Map

Atlas | Reverse Dictionary | Rhyming Dictionary

Dictionary | Thesaurus | Unabridged Dictionary

One entry found for **de-energize**.

Main Entry: **de-en er gize**
Pronunciation: "dE-'e-n&r-"jIz
Function: *transitive verb*
Date: 1925
: to disconnect from a source of electricity : shut off the power to

Get the **Top 10 Most Popular Sites for "de-energize"**

For **More Information on "de-energize" go to Britannica.com**

Find **Photos, Magazines and Newspaper Articles about "de-energize"** at eLibrary. Free registration required.

Pronunciation Symbols
Click on the example word to hear it pronounced.

\&\ as **a** and **u** in abut	\e\ as **e** in bet	\o\ as **aw** in law
\^&\ as **e** in kitten	\E\ as **ea** in easy	\oi\ as **oy** in boy
\&r\as **ur/er** in further	\g\ as **g** in go	\th\ as **th** in thin
\a\ as **a** in ash	\i\ as **i** in hit	\th\ as **th** in the
\A\ as **a** in ace	\I\ as **i** in ice	\ü\ as **oo** in loot
\ä\ as **o** in mop	\j\ as **j** in job	\u\ as **oo** in foot
\au\ as **ou** in out	\[ng]\ as **ng** in sing	\y\ as **y** in yet
\ch\ as **ch** in chin	\O\ as **o** in go	\zh\ as **s** in vision